US006606102B1

(12) United States Patent
Odom

(10) Patent No.: US 6,606,102 B1
(45) Date of Patent: Aug. 12, 2003

(54) **OPTIMIZING INTEREST POTENTIAL**

(76) Inventor: **Gary Odom**, 15505 SW. Bulrush La., Tigard, OR (US) 97223

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 477 days.

(21) Appl. No.: **09/586,278**

(22) Filed: **Jun. 2, 2000**

(51) **Int. Cl.**^{7} **G09G 5/00**

(52) **U.S. Cl.** **345/745**; 345/733; 345/747; 345/764; 345/765

(58) **Field of Search** 345/744, 968, 345/733, 745, 747, 764, 765, 866, 810, 835; 707/3, 5, 6, 10; 709/201, 202, 203

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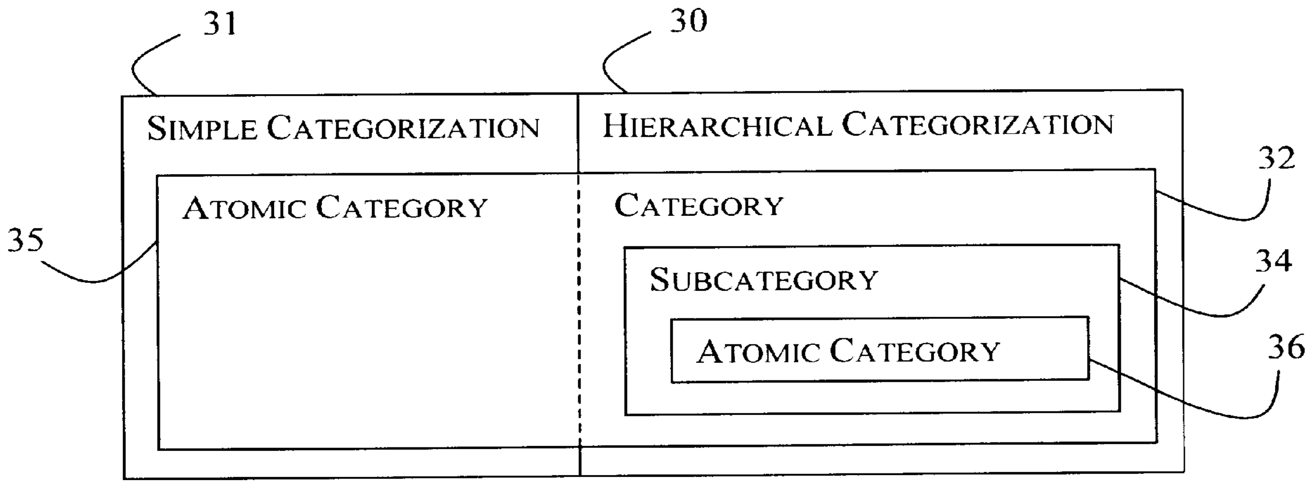
Primary Examiner—Raymond J. Bayerl
Assistant Examiner—Cuong T. Thai

(57) **ABSTRACT**

Described are methods to accommodate user interests in content available in information-rich software environments. As a dynamic process, user profiles are surreptitiously obtained by discerning and collating user interest based upon patterns of search and selection of displayed descriptor-based content. Based upon encapsulated user profiles, content characteristics of interest to users may be discerned, and content display altered to optimize individual user interest potential.

60 Claims, 11 Drawing Sheets



Dockets.Justia.com

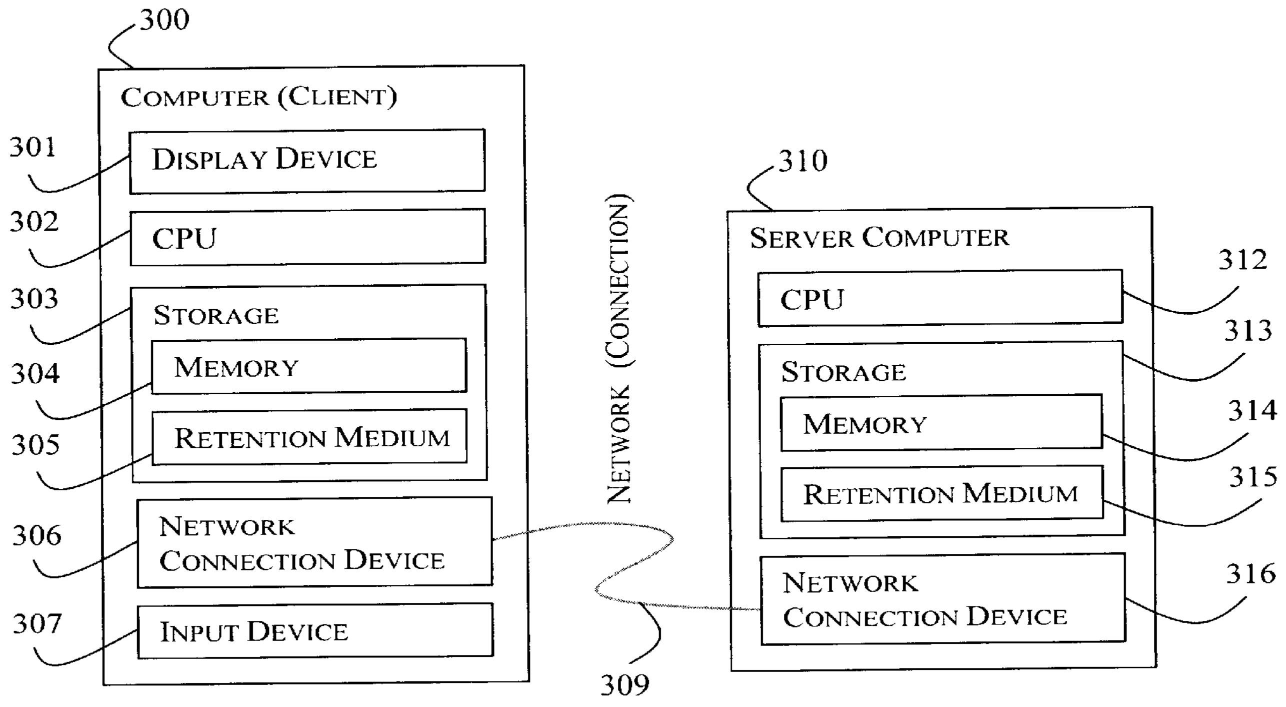

300
COMPUTER (CLIENT)
301
DISPLAY DEVICE
302
CPU
303
STORAGE
304
MEMORY
305
RETENTION MEDIUM
306
NETWORK CONNECTION DEVICE
307
INPUT DEVICE
NETWORK (CONNECTION)
309
310
SERVER COMPUTER
312
CPU
313
STORAGE
314
MEMORY
315
RETENTION MEDIUM
316
NETWORK CONNECTION DEVICE

FIGURE 1

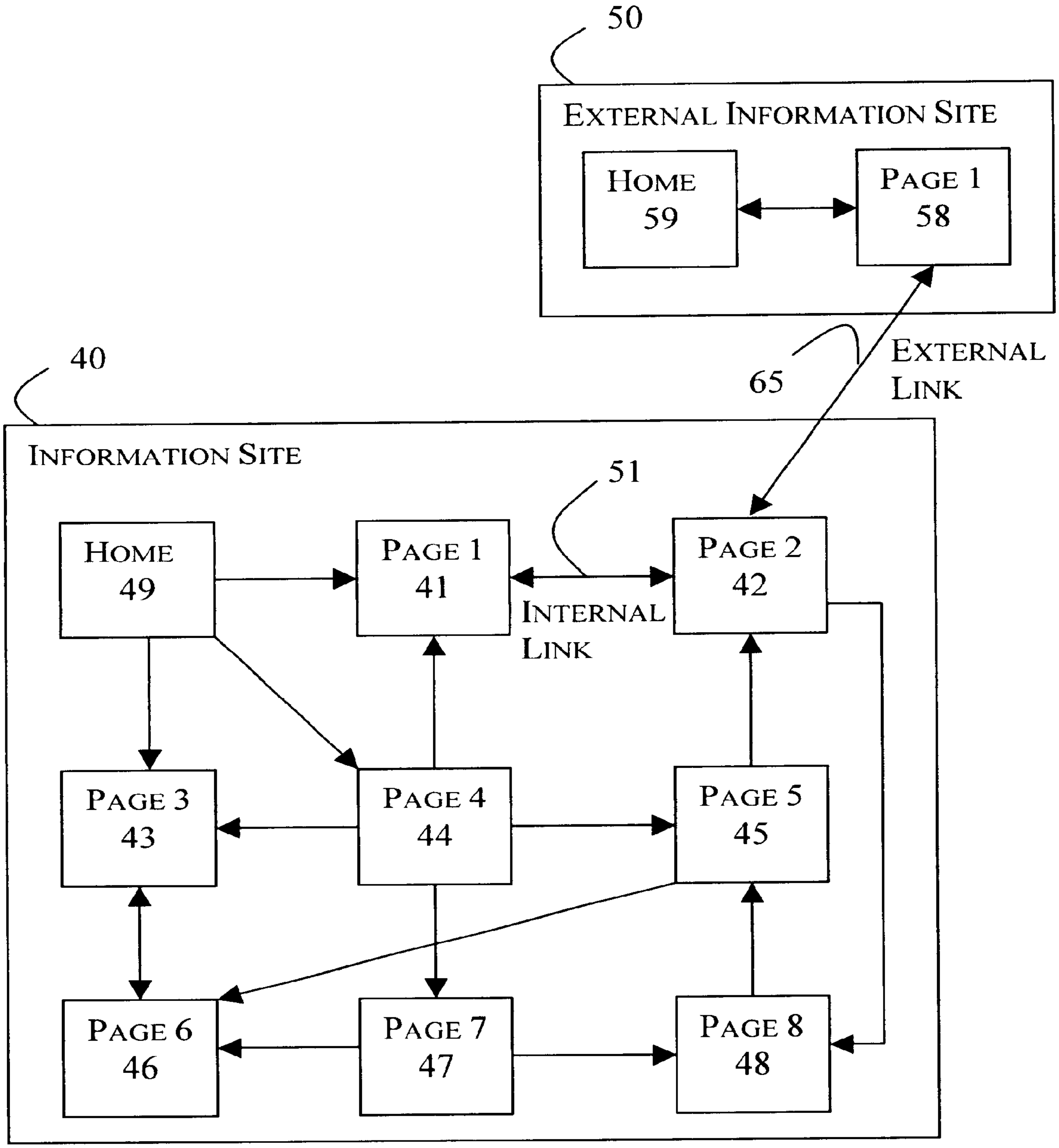

50
EXTERNAL INFORMATION SITE
HOME 59
PAGE 1 58
65
EXTERNAL LINK
40
INFORMATION SITE
51
HOME 49
PAGE 1 41
INTERNAL LINK
PAGE 2 42
PAGE 3 43
PAGE 4 44
PAGE 5 45
PAGE 6 46
PAGE 7 47
PAGE 8 48

FIGURE 2

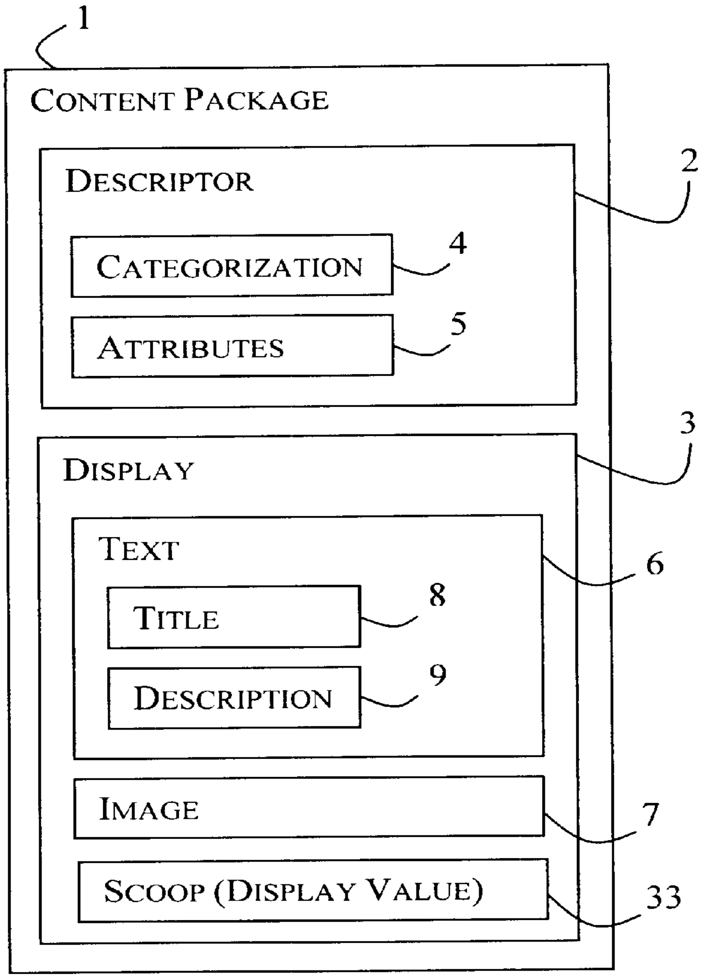

1
CONTENT PACKAGE
DESCRIPTOR
2
CATEGORIZATION
4
ATTRIBUTES
5
DISPLAY
3
TEXT
6
TITLE
8
DESCRIPTION
9
IMAGE
7
SCOOP (DISPLAY VALUE)
33

FIGURE 3

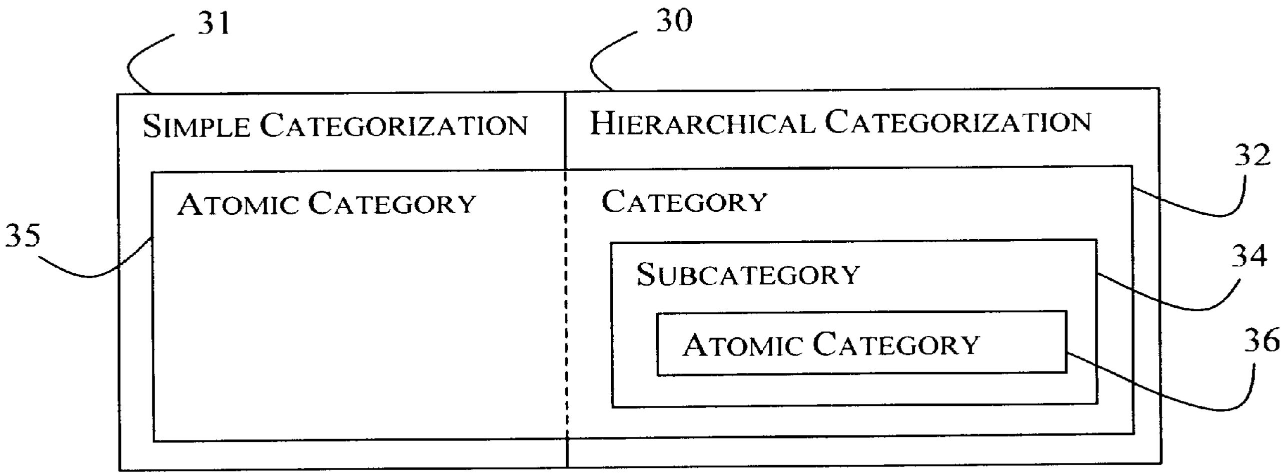

31
30
SIMPLE CATEGORIZATION
HIERARCHICAL CATEGORIZATION
32
ATOMIC CATEGORY
CATEGORY
35
SUBCATEGORY
34
ATOMIC CATEGORY
36

FIGURE 4

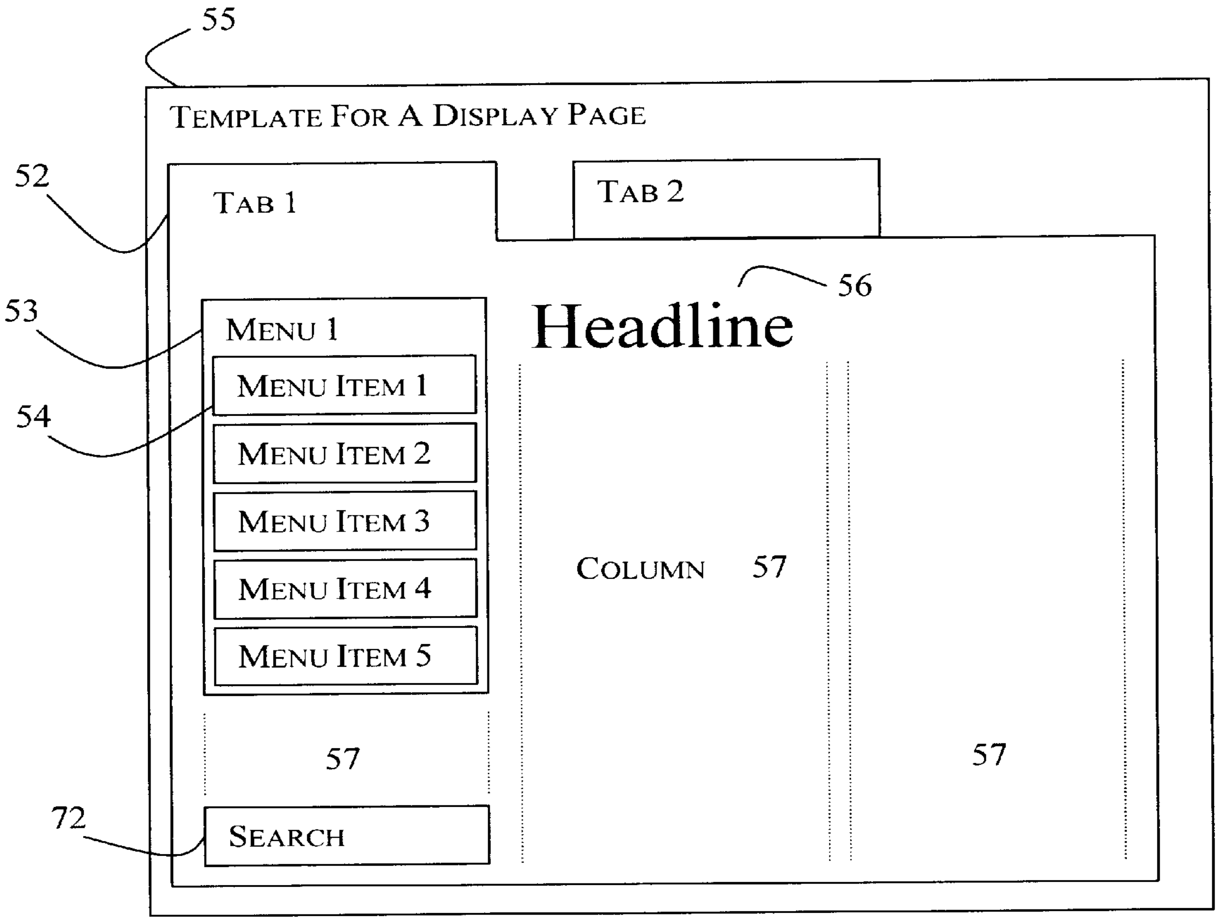

55
TEMPLATE FOR A DISPLAY PAGE
52
TAB 1
TAB 2
56
Headline
53
MENU 1
MENU ITEM 1
54
MENU ITEM 2
MENU ITEM 3
MENU ITEM 4
MENU ITEM 5
COLUMN 57
57
57
72
SEARCH

FIGURE 5

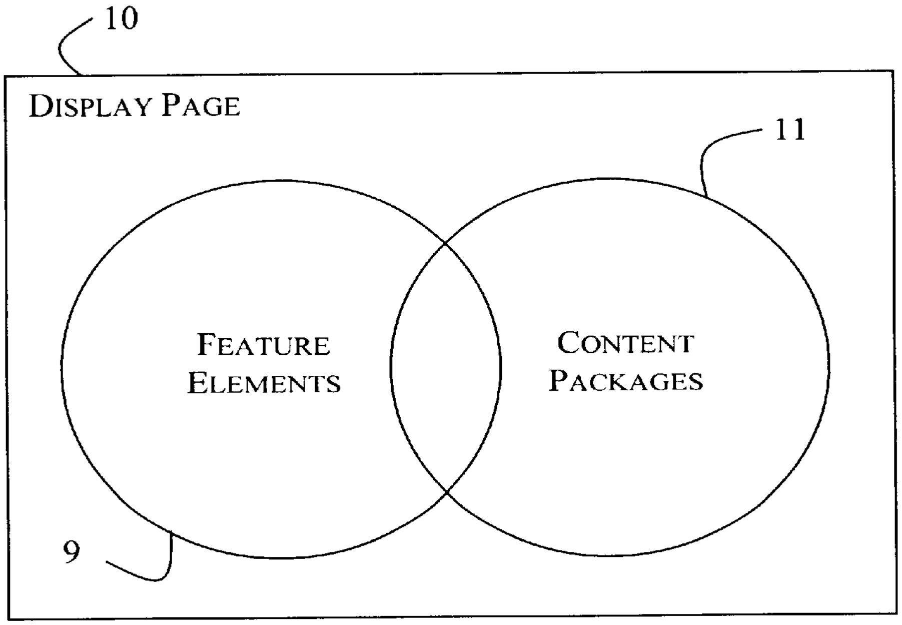

10
DISPLAY PAGE
11
FEATURE ELEMENTS
CONTENT PACKAGES
9

FIGURE 6

FACTOR DISPLAY VALUE 37

133	DISPLAY VALUE FACTORS 15			HIGH VALUE	LOW VALUE
16 LAYOUT	LOCATION 18			TOP-LEFT	BOTTOM-RIGHT
	SIZE 19			BIG	SMALL
	GROUPING 20			GROUPED	UNGROUPED
17 VIVIDNESS	DELINEATION 21			DELINEATED	UNDIFFERENTIATED
	COLOR 22	HUE 24		WARM	COOL
		SATURATION 25		HIGH	LOW
		VALUE 26		BRIGHT	DARK
	SHAPE 23			IRREGULAR	RECTANGULAR

FIGURE 7

	GRAPHIC COLOR TYPE (261)	EXAMPLE	INPUT VALUE (262)
250	LOW IMPACT BACKGROUND	LIGHT B&W	0.10
251	MID IMPACT BACKGROUND	UNSATURATED COLOR	0.28
252	MID-HIGH BACKGROUND	MEDIUM-DARK SATURATED COLOR	0.40
253	HIGH IMPACT BACKGROUND	BRIGHT SATURATED COLOR	0.52
254	MAX IMPACT BACKGROUND	SATURATED YELLOW BACKGROUND	0.60
255	GRAY SCALE IMAGE	B&W PHOTO	0.20
256	HIGH CONTRAST B&W	B&W BOLD LINE DRAWING	0.34
257	LOW IMPACT COLOR	COLOR (NEWS) PHOTO	0.50
258	MID IMPACT COLOR	SATURATED COLOR PHOTO, COLOR GRAPHIC	0.70
259	HIGH IMPACT COLOR	BOLD, HIGH CONTRAST GRAPHIC	0.90
260	MAX IMPACT COLOR	BOLD, HEAVILY YELLOW GRAPHIC	1.00

FIGURE 8

NOMINAL SCOOP (333) = LAYOUT (16) + VIVIDNESS (17)

WHERE:

LAYOUT = LOCATION (18) + SIZE (19)

VIVIDNESS = DELINEATION (21) + GRAPHIC INTENSITY (120) + ANIMATION (121)

LOCATION:

122 OBSCURITY DISTANCE = DISTANCE FROM THE BOTTOM RIGHT CORNER OF A PAGE TO THE BOTTOM RIGHT CORNER OF A CONTENT PACKAGE

123 LOCATION FACTOR = OBSCURITY DISTANCE / HIGHEST OBSCURITY DISTANCE 124

125 RELATIVE LOCATION = LOCATION FACTOR / ∑ [ALL LOCATION FACTORS] 126

18 LOCATION = RELATIVE LOCATION * LOCATION WEIGHT 127

SIZE:

128 BOUNDING AREA = WIDTH (129) * HEIGHT (130)

131 SIZE FACTOR = BOUNDING AREA / LARGEST BOUNDING AREA (132)

133 RELATIVE SIZE = SIZE FACTOR / ∑ [ALL SIZE FACTORS] 134

19 SIZE = RELATIVE SIZE * SIZE WEIGHT 135

DELINEATION:

20 GROUPING = MENU ITEM (54) | TAB (52) (| = OR) 137

136 DELINEATED = GROUPING + HEADLINED + BORDERED 138

139 RELATIVE DELINEATION = DELINEATED / ∑ [ALL DELINEATED] 140

21 DELINEATION = RELATIVE DELINEATION * DELINEATION WEIGHT 141

FIGURE 9A

GRAPHIC: 151 152

150 SINGLE GRAPHIC = GRAPHIC WIDTH * GRAPHIC HEIGHT 154

153 GRAPHIC AREA = ∑ [FOR EACH GRAPHIC: SINGLE GRAPHIC] 156

155 GRAPHIC FACTOR = GRAPHIC AREA / LARGEST GRAPHIC AREA

157 RELATIVE GRAPHIC = GRAPHIC FACTOR / ∑ [ALL GRAPHIC FACTORS] 158

159 GRAPHIC = RELATIVE GRAPHIC * GRAPHIC WEIGHT 170

COLOR: 172 173

171 COLOR FACTOR = COLOR VALUE / HIGHEST COLOR VALUE

173 RELATIVE COLOR = COLOR FACTOR / ∑ [ALL COLOR FACTORS] 174

175 COLOR INTENSITY = RELATIVE COLOR * COLOR WEIGHT 176

GRAPHIC INTENSITY:

177 GRAPHIC PRODUCT = GRAPHIC * COLOR INTENSITY

120 GRAPHIC INTENSITY = GRAPHIC PRODUCT * GRAPHIC PRODUCT WEIGHT 178

ANIMATION: 161

160 RELATIVE ANIMATION = ANIMATED / ∑ [ALL ANIMATED] 162

121 ANIMATION = RELATIVE ANIMATION * ANIMATION WEIGHT 164

(NORMALIZED) SCOOP = NOMINAL SCOOP / HIGHEST SCOOP ON THE PAGE

33 333 163

FIGURE 9B

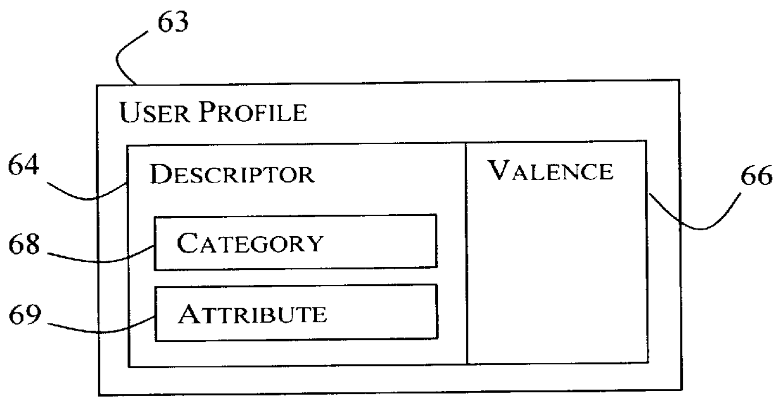

63
USER PROFILE
64
DESCRIPTOR
VALENCE
66
68
CATEGORY
69
ATTRIBUTE

FIGURE 10

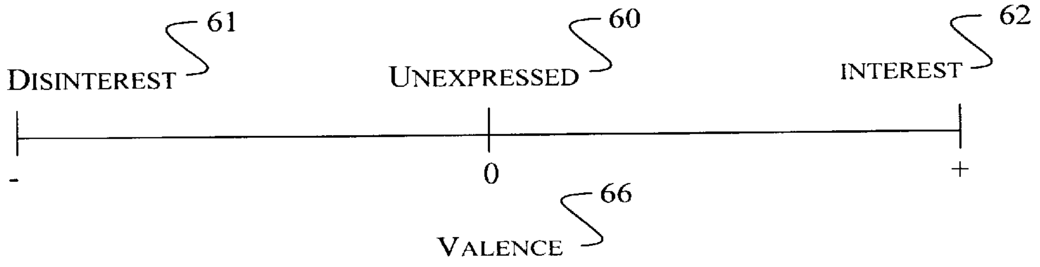

61
60
62
DISINTEREST
UNEXPRESSED
INTEREST
-
0
+
66
VALENCE

FIGURE 11

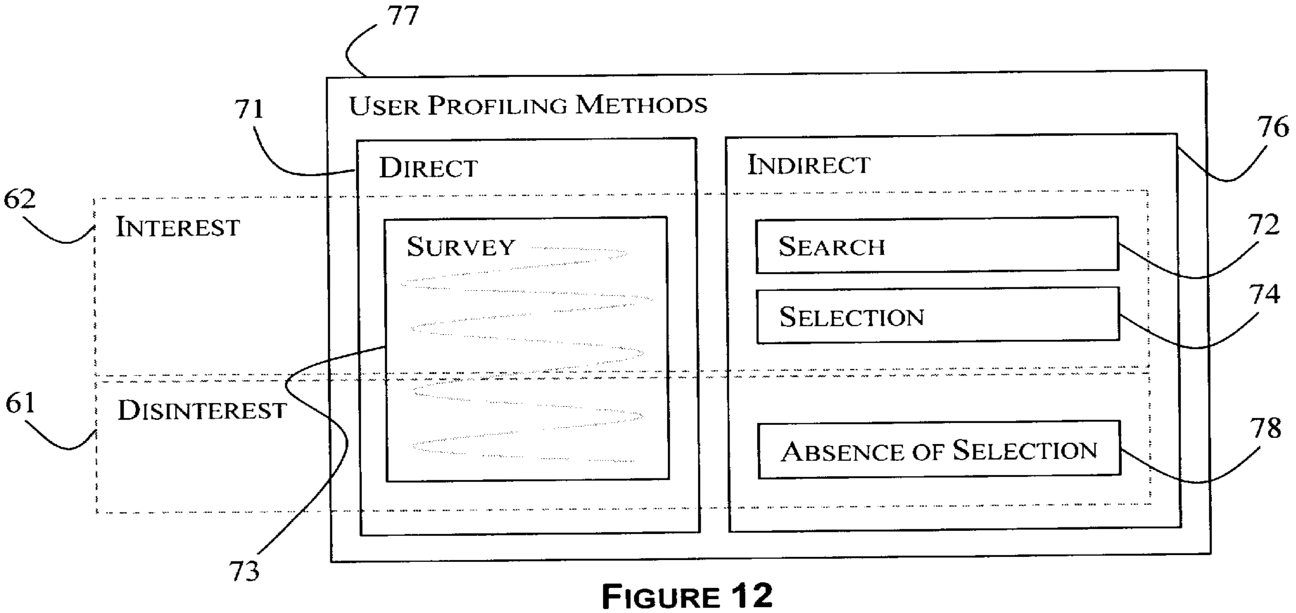

77
USER PROFILING METHODS
71
DIRECT
INDIRECT
76
62
INTEREST
SURVEY
SEARCH
72
SELECTION
74
61
DISINTEREST
ABSENCE OF SELECTION
78
73

FIGURE 12

SEARCH: 66 80 81

VALENCE += SEARCH VALUE * SEARCH TERM DISCOUNT FACTOR

SELECTION: 82 83 84

VALENCE += DISCRIMINATION – SELECTION DISTRACTION + CONSUMPTION

ABSENCE OF SELECTION:

VALENCE – = ABSTINENCE

85

WHERE:

DISCRIMINATION: 87

(FOR EACH DESCRIPTOR IN THE SELECTED CONTENT PACKAGE) 89 90

88 DESCRIPTOR UNIQUENESS = # WITHOUT THAT DESCRIPTOR / # OF CONTENT PACKAGES

91 UNIQUENESS SUM = ∑ [FOR EACH DESCRIPTOR IN THE SELECTED CONTENT PACKAGE: DESCRIPTOR UNIQUENESS] 92

93 PROXIMITY = UNIQUENESS SUM / # OF CONTENT PACKAGES

DISCRIMINATION = PROXIMITY * DISCRIMINATION WEIGHT 94

ABSTINENCE: 97

(FOR EACH DESCRIPTOR NOT SELECTED) 102

101 ABSTINENCE UNIQUENESS SUM = ∑ [FOR EACH DESCRIPTOR NOT SELECTED: DESCRIPTOR UNIQUENESS]

103 RELATIVE ABSTINENCE = ABSTINENCE UNIQUENESS SUM / # OF CONTENT PACKAGES

ABSTINENCE = RELATIVE ABSTINENCE * ABSTINENCE WEIGHT 104

FIGURE 13A

CONSUMPTION (FOR A READABLE PAGE): 96 98

95 WITNESS = MAX [MEASURED WITNESS | CONSUMPTION REQUIREMENT]

99 CONSUMPTION PERCENTILE = WITNESS / CONSUMPTION REQUIREMENT

84 CONSUMPTION = CONSUMPTION PERCENTILE * CONSUMPTION WEIGHT 100

DISTRACTION:

110 PAGE SCOOP = ∑ [FOR EACH CONTENT PACKAGE: SCOOP] 106

105 RELATIVE SCOOP = SELECTED CONTENT PACKAGE SCOOP / PAGE SCOOP

83 DISTRACTION = RELATIVE SCOOP * DISTRACTION WEIGHT 107

FIGURE 13B

AGGREGATION ANALYSES: 112

111 DESCRIPTOR VALENCE AGGREGATION = ∑ [FOR EACH USER, FOR A DESCRIPTOR: VALENCE]

113 CONTENT VALENCE AGGREGATION = ∑ [FOR EACH DESCRIPTOR IN THE CONTENT PACKAGE: DESCRIPTOR VALENCE AGGREGATION] 114

115 DESCRIPTOR USER AGGREGATION = LIST [FOR A DESCRIPTOR: USERS] 116

117 CONTENT USER AGGREGATION = LIST [FOR VALENCE TO EACH DESCRIPTOR IN THE CONTENT PACKAGE: USERS] 118

FIGURE 14

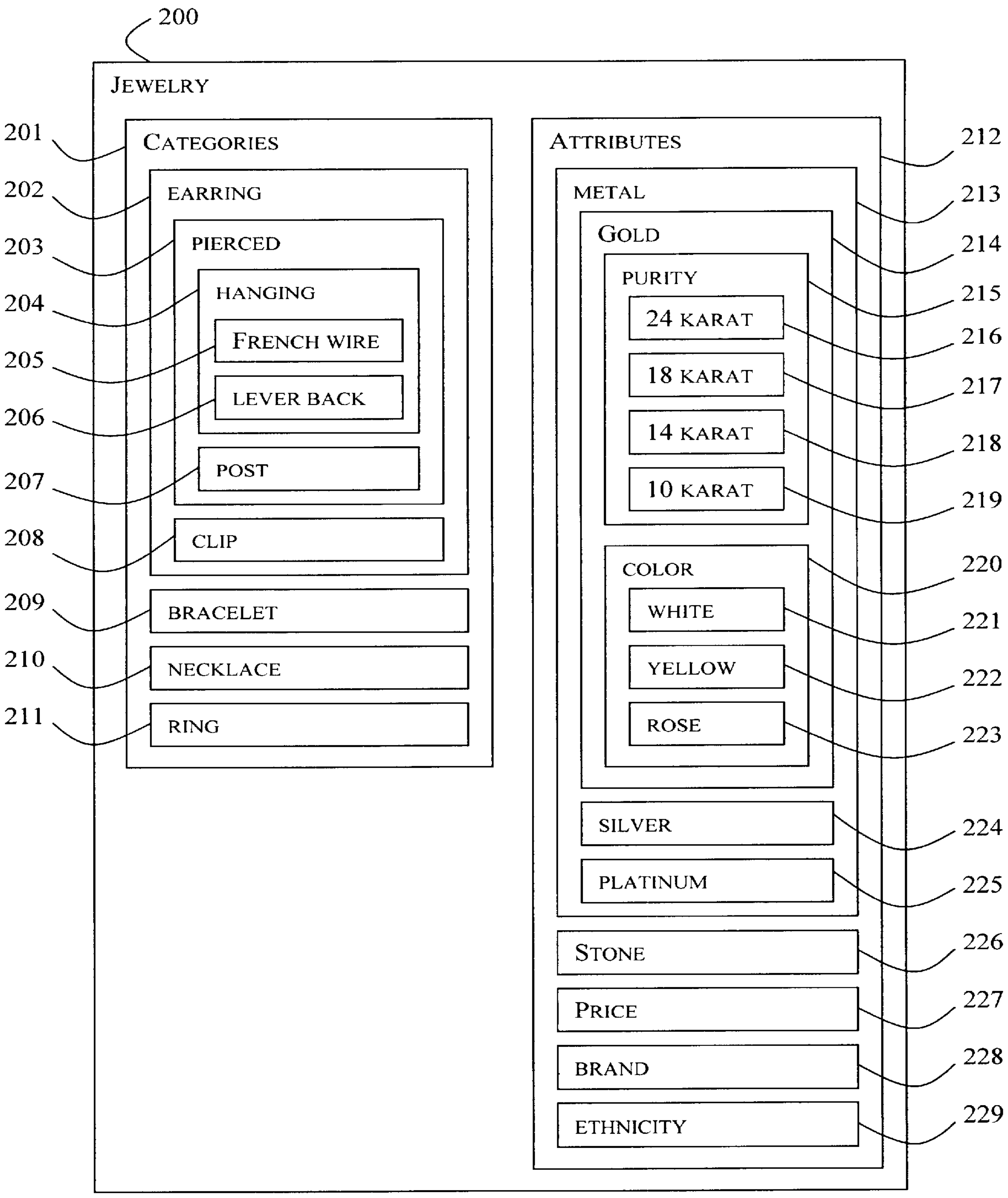

200
JEWELRY
CATEGORIES
EARRING
PIERCED
HANGING
FRENCH WIRE
LEVER BACK
POST
CLIP
BRACELET
NECKLACE
RING
201
202
203
204
205
206
207
208
209
210
211
ATTRIBUTES
METAL
GOLD
PURITY
24 KARAT
18 KARAT
14 KARAT
10 KARAT
COLOR
WHITE
YELLOW
ROSE
SILVER
PLATINUM
STONE
PRICE
BRAND
ETHNICITY
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229

FIGURE 15

OPTIMIZING INTEREST POTENTIAL

TECHNICAL FIELD

The invention relates to methods and apparatus for assessing displayed content on data processing systems, collating user interest in displayed content, and altering content to optimize user interest potential.

BACKGROUND OF THE INVENTION

Content-rich software environments face the daunting task of optimally organizing information of interest to individual users. The ideal solution would be self-organizing display based upon expressed user interest. Relying upon user surveys is impractical, as content may be too diverse or change frequently, and users are anyway often reluctant or unwilling to answer questionnaires for a variety of reasons, including tediousness and privacy concerns. There has been an unmet need to organize and alter display content for individuals so as to optimize user interest potential based upon surreptitious observation of patterns of expressed interest in content.

SUMMARY OF THE INVENTION

An essential aspect of this invention is providing descriptors of displayed content such that user exploration of content reveals interest in or avoidance of certain content. Another aspect is attribution of the relative display value of content. Another aspect is encapsulation of user interest and disinterest (valence) based upon selection or absence of selection of content. Another aspect is encapsulation of user valence in content based upon search nomenclature. Another aspect is indirect discernment of individual user valence for the separate characteristics of displayed content. Another aspect is grouping of users by characteristics of expressed interest, and aggregation of characteristics of interest to users. Another aspect are ways to arrange content display to optimize user interest and convenience based upon observed patterns.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of computers suitable for practicing the invention.

FIG. **2** depicts information sites.

FIG. **3** depicts aspects of a content package.

FIG. **4** depicts categorization.

FIG. **5** depicts an example display page template.

FIG. **6** depicts display page components.

FIG. **7** depicts display value factors.

FIG. **8** is a table of graphic color types.

FIGS. **9***a*, **9***b* depict quantitative methods for content package display value.

FIG. **10** depicts a user profile.

FIG. **11** depicts valence.

FIG. **12** depicts user profiling methods.

FIGS. **13***a*, **13***b* depict quantitative methods for valence.

FIG. **14** depicts quantitative methods for aggregation analyses.

FIG. **15** depicts an example of descriptors.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** is a block diagram of a client computer **300** connected to a server computer **310** through a network **309**.

A client computer **300**, more simply called a client or a computer, comprises at least a CPU **302**; storage **303**, which comprises memory **304** and optionally one or more devices with retention medium(s) **305** such as hard disks, diskettes, compact disks, or tape; a display device **301**; and one or more input devices **307**, such a keyboard and/or mouse. A display device **301** is capable of dynamically displaying different displays of information. The aggregate of information displayed on a display device is called display content **10**. As a client **300** in a network, a computer **300** also comprises a device for connection to a network **306**. A server computer **310**, more simply called a server, comprises at least a CPU **312**; storage **313**, which may comprise memory **314**, and possibly one or more devices with retention medium(s) **315** such as hard disks, diskettes, compact disks, or tape; and a device for connection to a network **316**. Related to the invention, a client **300** primarily receives data. A user is a user of a client computer **300**. Related to the invention, a server **310** primarily transmits data to be received by one or more clients **300**. A network **309** may be any means by which one or more clients **300** are connected to one or more servers **310** for data transfer. A client-server environment is a setup whereupon one or more clients **300** are connected to one or more servers **310** through a network **309**.

FIG. **2** depicts an information site **40**. An information site **40** comprises a set of display pages **10**, including at least one initial display, called a home page **49**, and other pages (42–48) linked to each other (example internal link **51**) and, directly or indirectly, to the home page **49**. A display page **10** is also called a multiple content display **10**, as each display page **10** displays multiple packages of content **11** that correspond to separate units of information.

A topically and geographically identifiable subset of content **11** on a display page **10** is called a content package **1**. As shown in FIG. **3**, a content package **1** comprises two aspects: descriptor **2** and display **3**.

A content descriptor **2** is taxonomic data related to a content package **1**. It is essential for the invention that a content package **1** has descriptor data **2**. In the preferred embodiment, a descriptor **2** comprises categorization **4** and attributes **5**. Categorization **4** is an ordering of content. As shown in FIG. **4**, categorization **4** may be hierarchical **30** or non-hierarchical **31**. Hierarchical categorization **30** may comprise categories **32** and subcategories **34**, while non-hierarchical categorization **31** has only atomic categories **35**. The lowest level category in hierarchical categorization **30** is an atomic category **36**. In the preferred embodiment, categorization **4** comprises at least some hierarchical categories **30**. In an alternative embodiment, categorization **4** may be entirely non-hierarchical **31**. Attributes **5** qualify categorization **4**. Attributes **5** may have their own categories. Attributes **5** may be atomized to possible options. Attributes **5** are nonexclusive, and the same attribute may apply to different categories. A content package **1** typically has several attributes **5**, sometimes even multiple options of the same attribute **5** (such as color). In an alternative embodiment, descriptor data **2** may lack categorization **4** or attributes **5**.

Content display **3** is a bounded visual display of information related to a content package **1**. A content display **3** may comprise text **6**, including title **8** and/or description **9**, and/or visual and/or audio elements **7**. Visual and/or audio elements **7** are for simplicity's sake referred to as image **7**. A simple content display **3** may be only a text title **6** or image **7**.

FIG. **14** is an example of descriptors **2** for jewelry **200**. Jewelry categories **201**, which are hierarchical **30**, may comprise earring **202**, bracelet **209**, necklace **210** and ring **211**. Earring subcategories **34** may comprise pierced **203** and clip **208**. Pierced earrings **203** may comprise hanging **204** and post **207** categories **34**. Hanging pierced earrings **204** may comprise French wire **205** and lever back **206** atomic categories **36**. Categories of jewelry attributes may comprise metal **213**, stone **226**, price **227**, brand **228** and ethnicity **229**. Attributes **5** may have categories, such as metal **213** in this example. Metals commonly used in jewelry include gold **214**, silver **224** and platinum **225**. Gold **214** is an attribute **5** unto itself, even though the characteristics of gold **214** may be further specified. For example, a consumer may prefer gold **214** to silver **224**, regardless of further specification. Gold **214** has two defining categories of attribute: color **220** and purity **214**. Common gold purities **215** comprise 24 karat **216**, **18** karat **217**, **14** karat **218**, and the least expensive commonly available in the U.S., 10 karat **219**. Gold colors **220** comprise yellow **222**, white **221** and rose **223**. In the figure, price **227** is shown as a single attribute, but, in the case of jewelry **200**, has distinguishable variants: high and low. Most often consumers have a preference for lower-priced goods and services of the same function, but certain goods such as jewelry also posses to some status value, or "snob appeal", where consumers may actually prefer higher-priced items. In this instance there may be two atomized price attributes **5**: low price and high price. A user of a jewelry information site may express interest in high-priced or low-priced jewelry almost exclusively; in the invention, a user expressing interest **62** in both high- and low-priced jewelry effectively eliminates price **227** as a discerning attribute qualifying that user's interests.

Typically, a set of templates **55** are used for display pages **10** in an information site **40**. FIG. **5** depicts an example template **55**. A template **55** for a page **10** typically comprises at least some consistent content packages **11**. A menu **53**, for example, is typically in the same place, as users would find it disconcerting to see a menu **53** in different places on different pages **10**, or sometimes provide a menu **53** and sometimes not, though all pages **10** , typically pages **10** indirectly linked to the home page **49**, may not have a menu **53**. Tabs **52** have become a common way to provide quick access and delineate multiple home pages **49** in a site **40** that comprises different categories **4** of content **11**. Invisible placement guides, such as columns **57**, may be used in a template **55** to structure content package **1** display which varies on a per page **10** basis. Search capability **59** is common for information sites **40**, and a valuable assist in constructing a user profile **63**.

It is essential for the invention that at least one display page **10** in an information site **40** comprise multiple content packages **11** available for user selection. Content packages **11** on a page **10** are more simply called display content **11** or, most simply, content **11**.FIG. **6** depicts that the set of feature elements **9** overlaps the set of content packages **11**. Feature elements **9** may provide a venue for presentation of content packages **11**, but content packages **11** also incorporate feature elements **9**. In other words, a content package **1** may both have feature elements **9** and may be given heightened or lessened display value **33** by feature elements **9** external to the content package **1**. For example, a menu item **54**, as depicted in FIG. **4**, may be a relatively nondescript text title **8**, but is given augmented display value **33** by virtue of incorporation into a menu **53**.

FIG. **7** depicts factors of display value **15**. Content package display value **33** is a relative measure of visual prominence of a content package **1** on a display page **10**. High display value is visible prominence, while low display value is obscurity. Display value **33** is also called scoop **33** (because it catches the eye). The factors determining display value **15** comprise layout **16** and vividness **17**, which collectively constitute feature elements **9**. Layout **16** is overall arrangement of content packages **11**. Aspects of layout **16** include location **18**, size **19** and grouping **20**. Location **18** is the relative location on a page **10**. Size **19** is the relative area of a content package **1** on a page **10**. Grouping **20** relates to visible organization of content packages **11**. Vividness **17** includes delineation **21**, color **22** and shape **23**. Delineation **21** refers to whether and how a content package **1** is differentiated from others around it **11**. Color **25** comprises hue **26**, saturation **27** and value **28**. Shape **21** is the regularity of a content package **1**. Illustrative factor display value indicators **37** are also shown in FIG. **7**. Specific factor display values **37** may be affected by cultural and individual preferences, and especially usage in context.

There are consistencies in calculations related to scoop **33** used in the preferred embodiment. First, a scale used in measurement should be consistent throughout a site **40**, and must be consistent within the scope of equivalent measurements, but the scale employed is otherwise optional, as relative, not absolute, derived values are used. Second, weights are used in calculations to adjust relative factors. Third, alternative embodiments may employ different factors or scales or values or steps or calculation.

Content package scoop **33** is a composite of display value factors **15**. The invention employs a quantitative method to ascribe content package scoop **33**. The preferred embodiment uses, where convenient, direct display value factors **15** or, if direct measurement is not readily available, quantifiable surrogates of display value factors **15**; alternative embodiments may do likewise. In the preferred embodiment, for example, shape **23** is not directly incorporated in calculating scoop **33**.

Nominal scoop **333** equals layout **16** plus vividness **17**. Layout **16** equals location **18** plus size **19**. Vividness **17** equals delineation **21** plus graphic intensity **120** plus animation **121**.

In the preferred embodiment, obscurity distance **122** for a content package **1** is the distance from the bottom right corner of a display page **10** to the bottom right corner of the content package **1**. The preferred embodiment assumes the top-left corner of a page is the best page location, all other display value factors **15** being constant. An alternative embodiment may make a different assumption about best page location, and adjust obscurity distance **122** measurement accordingly. Location factor **123** is obscurity distance **122** divided by the highest obscurity distance **124** for content on the page **11**. The content package **1** with the best location would have the highest obscurity distance **124**. Relative location **125** is location factor **123** divided by the sum of all location factors **126**. Location **18** is location factor **123** times location weight **127**.

The bounding area **128** for a content package **1** is its width **129** times height **130**. Size factor **131** is bounding area **128** divided by the largest bounding area of content packages on the page **132**. Relative size **133** is size factor **131** divided by the sum of all size factors **134**. Size **19** is relative size **133** times size weight **135**.

Grouping **20** is a measure of visual prominence based upon a content package **1** being incorporated into an overarching visual structure. Grouping **20** is one if an item is grouped, zero if not. In the preferred embodiment, if a content package **1** is a menu item **54** or a tab **52**, grouped **136** is one; otherwise zero. An alternative embodiment may have another grouping mechanism that should be considered to set grouping **20**. While grouping is a layout factor **16**, it also provides delineation **21**. In the preferred embodiment, grouping **20** is incorporated into quantitative calculation of delineation **21**. In an alternative embodiment, grouping **20** may be factored into scoop **33** differently.

Delineated **136** equals grouping **20** plus headlining **137** plus bordered **138**. An alternative embodiment may include underlining or other delineation means in calculating delineated **136**. If the content package **1** has a headline, the value of headlined **137** is one; otherwise zero. If the content package **1** has a bordered **138** around it, the value of bordered **138** is one; otherwise zero. Relative delineation **139** is delineated **136** divided by the sum of all delineated **140**. Delineation **21** is relative delineation **139** times delineation weight **141**.

Graphic intensity **120** as a factor of vividness **17** is conceptually encapsulated in the preferred embodiment as a product of the area of content package display graphic image(s) **153** times the average color intensity of the graphic (s) **175**. The preferred embodiment uses the bounding boxes of graphics in a content package **1** as a measure of graphic area **153**. The graphic size for a single graphic image **150** is its graphic width **151** times graphic height **152**. Graphic area **153** is the sum of the graphic sizes of all single graphics **150** in a content package **1**. It is a common technique to create non-rectangular graphics using contiguous multiple rectangular graphics. Graphic factor **155** is graphic area **153** divided by the largest graphic area of content packages on the page **156**. Relative graphic **157** is graphic factor **155** divided by the sum of all graphic factors **158**. Graphic **159** is relative graphic **157** times graphic weight **170**.

Color **22** is a significant display value factor **15**. Relative color intensity of graphics on a page **10** adds another dimension to quantification of vividness **17**. Among hue **24**, saturation **25** and value **26**, value **26** is most significant, followed by saturation **25**, then hue **24**. For hue **24**, high to low value generally ranges from warm colors to cool colors (yellow & red to green & blue). For saturation **25** and value **26**, display value **33** positively correlates to saturation **25** and value **26** values. Color display value analysis for content **11** with graphic images is done for each color factor **17** using a consistent scale. In the preferred embodiment, an input color value **262** quantifies color value **172** for the graphic content of a content package **159**. FIG. **8** gives the preferred embodiment scale for color input value **262**. For a content package **1** with multiple graphics, color value **172** may be a weighted average (by area) of color values for each single graphic **150**. If graphic intensity would differ greatly between images within a content package **1**, separate graphic intensity analysis may be performed for separate graphics as appropriate and summed for content package graphic intensity **120**.

In an alternative embodiment, cumulative pixel by pixel scan analysis of bitmap graphics may be the basis for automated quantitative measure of color value **172**. In this alternative embodiment, pixel color intensity is a product of banded trade-off scales of color saturation **25** and value **26** times hue **24**, where hue **24** is quantified by relative hue display value. Color dispersion of a graphic is factored in as a measure of contrast (contrast being an aspect of delineation **21** that is scoop **33** enhancing) to quantify color value **172**.

Color factor **171** is color value **172** divided by the highest color value of content packages on the page **173**. Relative color **173** is color factor **171** divided by the sum of all color factors **174**. Color intensity **175** is relative color **173** times color weight **176**.

Graphic product **177** is graphic times color intensity **175**. Graphic intensity **120** is graphic product **177** times graphic product weight **178**.

Though not in the preferred embodiment, graphic intensity analysis may also be appropriate for vivid headline text. Such headline text is typically more vivid low scoop backgrounds, but less vivid than high scoop images. As an extension of this idea, in an alternative embodiment, an entire content package **1** may be subject to vividness **17** analysis using the methods described.

Animation **121** by itself yields significantly enhanced display value **33**. Animated **161** is one if an item is animated, 0 (zero) if not. Relative animation **160** is animated **161** divided by the sum of all animated **162**. Animation **121** is relative animation **160** times animation weight **164**. Animation **121** may not be germane for some sites **40**.

For optional feature elements **9**, the method of calculation in the preferred embodiment using relative factors and measures quantifies the concept of relative distinction. For example, the value of animation **121** as a feature element **9** distinguishing a content package **1** from others is diminished as more content packages on a page **11** have animation.

Normalized scoop **33** is a variant of nominal scoop **333**, mathematically convenient because the range of normalized scoop **33** is zero to one. Scoop **33** is derived by dividing nominal scoop **333** by the highest scoop on the page **163**.

Scoop for a given page **110** with the same feature elements **9** may be considered constant. Typically some feature elements **9** on a page **10** vary, even though the same template **55** may be used. This is because a content package **1** may have its own feature elements **9**, hence may have a unique scoop **33**. For approximation purposes, scoop for a given template **110** may be considered constant unless the scoops **33** of content packages **11** in the same location **18** vary significantly.

A display page **10** may have one or more content packages **11** with an external link **65**, that is, a link **65** to a page **58** on an external site **50**. Advertising for other sites **50** is an example. If a content package **1** is identifiably exogenous, it may be disregarded it for page scoop analysis **110**. Alternately, a content package **1** with an external link **65** may be incorporated if descriptors **2** exist that allow profile analysis, and that content package **1** is considered relevant.

Individual user profiles **63** are essential to the invention. A user profile **63**, depicted in FIG. **10**, encapsulates a set of valences **66** to descriptors **64** (categories **68** and attributes **69**) for a particular user. User profile descriptors **64** map to content package descriptors **2**. Valence **66**, also depicted in FIG. **11**, is a measure of user interest **62** and possibly disinterest **61** to content descriptors **2**. In the preferred embodiment, valence **66** is a quantitative measure to each tracked descriptor **64**, but in a simpler alternative embodiment, valence **66** may be indicated by the presence of tracked descriptors **64** without quantitative measure. In the preferred embodiment, valence **66** may be positive or negative: positive valence is interest **62**, where higher (more positive) valence is stronger appeal; negative valence is disinterest **61**, where lower (more negative) valence is stronger aversion. Zero valence **60** is non-interest or unexpressed interest. In the preferred embodiment, disinterest **61** is tracked in a user profile **63**. In an alternative embodiment, only interest **62** may be tracked.

A user profile **63** may be stored in whole or part on a client **300** or server **310**, depending upon the embodiment. User identification may transpire using stored data on a client **300**, such as a cookie commonly used with Internet web site browsers, or through account authorization using a client **300** or server **310** based program.

As depicted in FIG. **12**, a user profile **63** may be discovered through two methods **77**: direct **71** and indirect **76**. Direct profiling **71** is directly asking a user for interests **62**, and possibly disinterests **61**. A survey **73** or questionnaire is a direct profiling method **71**, where a user registers valence **66** directly, comprising interests **62** and possibly disinterests **61**. Indirect profiling **76** is incrementally discovering valence **66** through a user's actions. With multiple content packages **11** on a display page **10** available for selection **74**, a user reveals interests **62** through selection **74**, and by consistency through time, disinterests **61** by lack of selection **78**. Accumulating such choices is an indirect profiling method **76**. Both selection **74** and absence of selection **78** reveal interest **62** and disinterest **61** respectively, so in the preferred embodiment a user profile **63** is constructed by tracking both selection **74** and absence of selection **78**. Using indirect profiling **76** in the preferred embodiment, from an starting point of unexpressed interest (zero) **60** for any descriptor **64**, every time a user makes a content package selection **74**, the valence **66** of descriptors **64** in that user's profile **63** that apply to the content package selected **74** are credited, and valence **66** of descriptors **64** not selected **78** are debited. An alternative embodiment may only track selection **74**, and thus only affirmative selections **74** or choices are credited. Using direct profiling **71** in the preferred embodiment, the valence **66** of descriptors **64** in a user profile **63** that apply to an affirmative choice **74** are credited, and valence **66** of alternate descriptors **64** not chosen **78** are debited. The quantitative methods used with indirect profiling **76** in the preferred embodiment to alter descriptor valence **66** are given in FIGS. **13***a* and **13***b*, and described below. Different embodiments may use different factors or steps to profile **77**.

Besides its utility to users, search **72** within an information site **40** is a coveted asset in constructing a user profile **63**, as a user reveals interest **62** directly. In the preferred embodiment, incremental valence **66** for search **72** is a product of search value **80** times search discount factor **81**. If a search term does not exactly match the descriptor **64**, a search term may be associated with a descriptor **64** using textual matching or a dictionary of associative words to descriptors **64** (textual fuzzy logic). If the search term / descriptor **64** match is exact, the search term discount factor **81** is one; if the match is not exact, the search term discount factor **81** may be set by default to 0.5 (one-half), or if fuzzy logic is used, a fractional surety measure of correctly associating the search term to a descriptor **64** may be used as search term discount factor **81**.

Proximity **93** is a measure of closeness of content package descriptors **2** on a display page **10**. Uniqueness is the inverse of proximity **93**. The greater the number of content packages **11** with overlap of descriptors **2**, the higher the proximity **93**; the less overlap, the more unique. Proximity **93** (or uniqueness) provides a basis to measure discrimination **82**. Discrimination **82** is a measure of user selection in relative proximity **93**. In other words, discrimination **82** is a measure of user choosiness. There are a few steps in the preferred method to measure discrimination **82** for a descriptor **2** in a selected content package **87**. A descriptor's uniqueness **88** may be measured by dividing the number of content packages on the page not having the target descriptor **89** by the number of content packages on a page go. A content package's uniqueness sum **91** may be measured by cumulative summation of descriptor uniqueness **88** for each descriptor **2** applying to that content package **92**. Proximity **93**, which is relative to other content packages **11** on a page **10**, is the content package's uniqueness sum **91** divided by the number of content packages on the page go. Discrimination **82** is proximity **93** times discrimination weight **94**.

Abstinence **85** is a measure of relative user apathy, the flip side of discrimination **82**, and is calculated similarly to discrimination **82**. Abstinence **85** applies only to those descriptors not selected **97**; descriptors selected **87** are not used in calculation of abstinence **85**. Abstinence uniqueness sum **101** is the sum of descriptor uniqueness **88** for each descriptor not selected **102**. Relative abstinence **103** is the abstinence uniqueness sum **101** divided by the number of content packages on the page go. Like proximity **93**, relative abstinence **103** is a relative measure. Abstinence **85** is relative abstinence **103** times the abstinence weight **104**.

In calculating discrimination **82** and abstinence **85**, the preferred embodiment is to use only the lowest level of categorization **4** that applies to the target content package **1**. This precludes categorization **4** from being too heavily weighted in calculation relative to attributes **5**. In the preferred embodiment, for selection **74** related to a hierarchical categorization **30**, once the incremental valence **66** for a subcategory **34** descriptor **64** has been calculated, its next higher category **32** may be credited with one-half the incremental valence **66** related to discrimination **82** or abstinence **85**. One implication is that user profile descriptors **64** map to content package descriptors **2** accordingly.

Decisiveness is a measure of quickness in selection **74**, how well a user knows what s/he wants. Vacillation signifies browsing without strong interest, while decisiveness signifies intention. One way to measure decisiveness is to measure duration between page display and user selection **74**, and apply a metric based upon the complexity of a page **10**, using the number of content packages go as indicative of complexity. Quantitatively, decisiveness is of minor significance, but may be revealing. Like discrimination **82**, decisiveness is an augmentative factor. Decisiveness is not used in the preferred embodiment, but may be accounted for in an alternative embodiment.

Consumption **84** may signal different forms of success for different types of information sites **40**. For a sales site, consumption **84** may mean purchasing merchandise or a service represented by a content package **1**. For a sales site, in the preferred embodiment, consumption **84** is achieved if a purchase decision is positively indicated, even if that decision is later rescinded. After all, a high level of interest **62** was indicated, even if a trade-off was later made that eliminated or deferred purchase. For a non-sale site, consumption may mean reading (or viewing or hearing) a page **10** displayed as a result of selecting **74** a content package **1**. Consumption **84** applies to the descriptors **2** of the content package **1** selected **74** that allow consumption **84**. The meaning and measure of consumption **84** for a non-sales site may differ for different media being consumed: one metric for readable print or graphics, another for videos, another for audio, though all are accounted in time measurement. To measure consumption **84** for a readable page on a non-sales site in the preferred embodiment, first measure witness **95**, a measure of how much time a user spent on the page generated by content package selection **74** (on the previous page). In the preferred embodiment, measured witness **96** is the duration that a display page **10** is topmost (in other words, consumable). Set Witness **95** to the larger of the measured witness **96** or consumption requirement **98**. Divide witness **95** by consumption requirement **98**, which is the duration required to consume the information on the selected page, to get the consumption percentile **99**. Multiply the consumption percentile **99** by consumption weight **100** to yield consumption **84**. To measure consumption **84** for a video or audio, multiply the consumption weight **100** by consumption percentile **99**, which in this case is equivalent to the percent watched or listened to respectively.

Decisiveness and consumption **84** are reliant upon time measurements that may not be readily available in some embodiments. While decisiveness is not a particularly significant metric, consumption **84** is very significant. As a work-around to quantify consumption **84** if duration measurement as described is not readily available, use the duration between generation of the consumable page and a change in the topmost page (if available), or generation of the succeeding page (if change of page is not available) as measured witness **96**. Decisiveness may be measured similarly. In an alternative embodiment, where measured witness **96** is impractical, consumption may be assumed (set witness **95** to consumption requirement **98**) if selection **74** is made.

For indirect profiling **76**, scoop **33** is a discount factor for a content package **1**. It's relatively easy to see a content package **1** with high display value, harder to find an obscure one. Accordingly, selection **74** of a relatively obscure content package may signify more genuine interest **62**, and perhaps the converse. Distraction **83** is a measure of the influence of scoop **33** in prompting user selection **74** of a content package **1**. Page scoop **110** is the sum of all content packages' scoops **33** on a page **10**. Relative scoop **99** is the target content package's scoop **33** divided by page scoop **110**. Distraction **83** is relative scoop 105 times distraction weight **107**.

Descriptor valence values **66** may cumulatively reach considerable disparity between interest **62** and disinterest **61**. In fact, to avoid potential user confusion, changes in display are not recommended until a threshold of disparity is reached. Variance of valence **66** may be adjusted using a smoothing function to keep valence values **66** within a specified range.

This invention facilitates valuating valance **66** to descriptors **2**/**64** and content **1**. Descriptor valence aggregation **111** is the net summation of users' valence **66** to a single content descriptor **2**. Descriptor valence aggregation **111** is calculated by summing valence **66** for a descriptor **2** from each user profile **63**. Content valence aggregation **113** is the net summation of descriptor valence aggregation **111** for each descriptor **2** in a real or hypothetical content package **1**. Content valence aggregation **113** yields statistical insight into which offered content achieves significant user valence **66**, and may provide factor analysis about which content descriptors **2** have particular valence **66**. Content valence aggregation **113** provides a statistical decision base for shifting content mix **11** on a site **40**. Content valence aggregation **113** also provides a statistical decision base upon which new content **11** with favorable characteristics may be envisioned.

This invention facilitates categorizing users based upon valence **66** to content **11**. User aggregation analysis flips valence aggregation analysis on its head by looking at which users are interested in particular content rather than which particular content interests users. Descriptor user aggregation **115** is compiling list of users with valence **66** to a single content descriptor **2**. Using descriptor user aggregation **115** as a springboard, content user aggregation **117** is compiling a list of users with valence **66** for each descriptor **2** in a real or hypothetical content package **1**. A cutoff threshold level of valence **66** may be specified for user aggregation analysis so that users with marginal valence **66** are not inappropriately corralled into a grouping. This applies to descriptor aggregation **115** and content user aggregation **117**. For descriptor user aggregation **115**, threshold cutoff applies to a user's valence **66** for a particular descriptor **2**. For content user aggregation **117**, threshold cutoff may be applied in a variety of ways, including weighting of single descriptors **2** based upon an assigned descriptor ordinal, or mixed weighting of multiple descriptors **2**. In one embodiment, descriptor aggregation **115** provides sufficient threshold cutoff for content user aggregation **117**.

In the preferred embodiment, both interest **62** and disinterest **61** are considered in the aggregation analyses described above. In alternative embodiments, only interest **62** or disinterest **61** may be considered.

The mutual exclusivity of descriptors **2** is an issue in the aggregation analyses described above. In the preferred embodiment, categorization **4** provides the basis for aggregation analyses. Attributes **5** are modifiers to categories **4**, and cross category boundaries, but in context of categorization **4** may provide additional specification resolution, so an alternative embodiment may consider attributes **5** as well as categorization **4**, in which case attributes **5** may be subsumed in the category **4** to which they apply. The descriptors **2** that serve as a basis for analysis should be mutually exclusive so as to avoid duplication: duplicate interest **62** accreditation or disinterest **61** debiting. If overlap exists in categorization **4**, the overlap may be accounted for using statistical factoring and weighting. The level of hierarchical categorization **30** examined may vary depending upon the degree of resolution required for the analysis (assuming hierarchical categorization **30** is used).

This invention provides the basis to alter page **10** content and display based upon valence **66** to descriptors **2**. Suggested content display changes based upon valence **66** include arranging menu items **54** and tabs **52** such that items of interest **62** are at optimal location **18**; altering layout **16** of content packages **11** and otherwise changing scoop **33**; and altering content **11** on a page **10**. The nominal approach may be to elevate scoop **33** of content **11** with expressed interest **62** and obfuscate avoided **61** content, but a temporary 'testing' strategy may at times be employed to validate previously disclosed valence **66**: enhance scoop **33** of disinterested **61** content **11** while obfuscating content **11** of interest **62**. Altering layout **16** or content **11** may be expeditiously accomplished by using templates **55**. The purpose of the invention is to guide organization and display of content **11** to optimize a user's utility of an information site **40**, not preclude choice.

What is claimed is:

1. A method in a single computer or networked computers for tailoring display of multiple user-selectable content packages on a single computer screen display based upon previously encapsulated user valence, comprising the following steps:

assigning descriptors to content packages, said descriptors comprising at least in part a categorization and including attributes independent of categorization, wherein an attribute may apply to multiple categories;

displaying multiple said content packages on a single display of a user's computer screen;

recording any user selection of at least one said content package having said descriptors;

repeatedly displaying said multiple content packages and recording said user selections while dynamically encapsulating user valence at least in part based upon both the categorization and attributes of the content descriptors of a plurality of selected content packages.

2. The method according to claim **1**, wherein said categorization of said descriptors is hierarchical.

3. The method according to claim **1**, wherein encapsulating user valence solely based upon content package selection or absence of selection, with no user typing of text evaluated as part of encapsulating user valance.

4. The method according to claim **1**, with the additional step of encapsulating user valence based upon both content package selection and user typing.

5. The method according to claim **4**, wherein, as part of encapsulating user valence, said user typing is related to at least one content package descriptor.

6. The method according to claim **1**, with the additional step of encapsulating user valence based upon both content package selection and user typing of at least one search word.

7. The method according to claim **1**, whereby identifying user interest in at least one category and multiple attributes.

8. The method according to claim **1**, with the additional step of selecting for display among other content packages at least one first content package having at least one attribute having been identified as being of user interest, but said first content package not having been identified as being in a category of user interest.

9. The method according to claim **1**, with the additional step of identifying multiple categories of user interest and ranking said categories.

10. The method according to claim **1**, with the additional step of ranking said attributes of interest.

11. The method according to claim **1**, wherein at least one said displayed content package does not have text.

12. The method according to claim **1**, wherein at least some attributes are categorized.

13. The method according to claim **12**, wherein said attribute categorization is hierarchical.

14. The method according to claim **12**, wherein said attribute categorization is independent of content descriptor categorization.

15. The method according to claim **1**, wherein a template is used in placing at least some of the displayed content packages.

16. The method according to claim **1**, with the additional step of accounting for the relative display value of at least one displayed and selected content package in encapsulating user valence.

17. The method according to claim **1**, wherein said content package descriptors also include a measure of display value.

18. The method according to claim **1**, with the additional step of accounting for distraction in encapsulating user valence.

19. The method according to claim **1**, wherein a user identifies himself or herself prior to displaying content packages that form the basis for encapsulating user valence.

20. The method according to claim **1**, with the additional step of encapsulating user discrimination using proximity as a basis.

21. The method according the claim **1**, with the following additional steps:

evaluating relative potential user interest between at least a first and second content packages based upon encapsulated user valence;

determining a higher relative potential user interest in said first content package over said second content package;

displaying said first content package with less display value than said second content package.

22. The method according the claim **1**, with the following additional steps:

evaluating relative potential user interest between at least a first and second content packages based upon encapsulated user valence;

determining a higher relative potential user interest in said first content package over said second content package;

displaying said first content package with more display value than said second content package.

23. The method of claim **1**, with the following additional steps:

encapsulating user valence for multiple users;

ranking the relative interest of at least two descriptors to said multiple users.

24. The method of claim **23**, wherein said descriptors are categories.

25. The method of claim **23**, wherein said descriptors are attributes.

26. The method of claim **1**, with the following additional steps:

encapsulating user valence for multiple users;

ranking the relative disinterest of at least two descriptors to said multiple users.

27. The method of claim **26**, wherein said descriptors are categories.

28. The method of claim **26**, wherein said descriptors are attributes.

29. The method according to claim **1**, wherein content packages are provided by a server computer through a network to a client computer for selection by a user of said client computer.

30. The method according to claim **29**, wherein data encapsulating user valence resides at least in part on said client computer.

31. The method-according to claim **29**, wherein data encapsulating user valence resides entirely on said server computer.

32. The method according to claim **1**, wherein user identification is kept on a client and accessed by a server prior to display of content.

33. The method according to claim **1**, with the additional step of identifying user disinterest in at least one category.

34. The method according to claim **1**, with the additional step of identifying user disinterest in at least one attribute.

35. The method according to claim **34**, with the additional step of encapsulating user abstinence.

36. The method according to claim **1**, wherein identifying user interest using at least in part a measure of decisiveness or consumption.

37. The method according to claim **1**, with the additional step of altering display of content packages based upon said encapsulated user valence.

38. The method according to claim **37**, wherein said display alteration includes at least in part removing from further display a content package previously displayed more than once to said user.

39. The method according to claim **37**, wherein said display alteration includes altering the location or size in display of at least one previously displayed content package.

40. The method according to claim **37**, wherein said display alteration includes altering the display of at least one previously displayed content package in a way that reduces said displayed content package's display value.

41. The method according to claim **37**, wherein said display alteration includes altering the display of at least one previously displayed content package in a way that increases said displayed content package's display value.

42. The method according to claim **1**, wherein at least one said single display comprises at least two content packages, each said content package having at least one category and at least one attribute, but with no common category or attribute.

43. The method according to claim **42**, with the additional step of encapsulating user valence based upon both any category and attribute of any selected content package.

44. The method according to claim **42**, with the additional step of encapsulating user valence based upon both any category and attribute of any content package not selected.

45. The method according to claim **1**, wherein said content package descriptors are non-quantitative.

46. A method in a single computer or networked computers for tailoring display of multiple user-selectable content packages on a single computer screen display based upon previously encapsulated user valence, comprising the following steps:

assigning descriptors to content packages, said descriptors comprising at least in part hierarchical categorization and including attributes independent of categorization, wherein an attribute may apply to multiple categories;

repeatedly displaying multiple content packages on a single display of a first user's computer screen, at first without regard to the specific user, then at least in part accounting for encapsulated user valence, as follows;

recording any user selection of any content package having said descriptors;

dynamically encapsulating user valence at least in part based upon both the categories and attributes of the content descriptors of a plurality of said selected content packages, whereby identifying user interest in at least one category and multiple attributes.

47. The method according to claim **46**, wherein encapsulating user valence based upon content package selection and absence of selection.

48. The method according to claim **47**, with the additional step of determining a descriptor of least interest to said first user.

49. The method according to claim **46**, with no user typing of text evaluated in encapsulating user valance.

50. The method according to claim **46**, with the additional step of incorporating into encapsulated user valence typing by said user.

51.The method according to claim **50**, wherein said user typing is related to at least one content package descriptor.

52. The method according to claim **46**, with the additional step of repeatedly displaying multiple content packages having overlapping descriptors, at least one descriptor having been identified of interest to said first user.

53. The method according to claim **46**, with the additional step of altering display of content packages to said first user based upon encapsulated user valence.

54. The method according to claim **46**, with the additional step of identifying at least one other second user with an interest in at least one descriptor of interest to said first user.

55. The method according to claim **54**, with the additional step of determining descriptor valence aggregation for at least one descriptor of interest to both said first and second users.

56. The method according to claim **55**, with the additional step of determining content valence aggregation for at least one content package.

57. The method according to claim **55**, with the additional step of determining content valence aggregation for at least one content package that has not been displayed to said first user.

58. The method according to claim **46**, with the additional step of determining a descriptor of most interest to said first user.

59. The method according to claim **58**, wherein said descriptor of most interest is a category.

60. The method according to claim **58**, wherein said descriptor of most interest is an attribute.

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